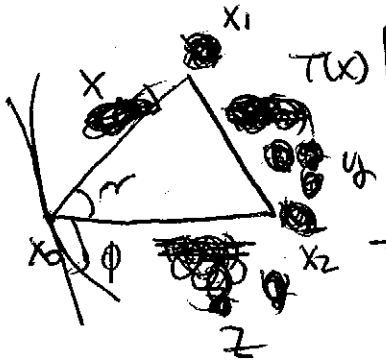

$$T(x)=\begin{bmatrix}\cosh(x) & \sinh(x)\\ \sinh(x) & \cosh(x)\end{bmatrix} \qquad R(x)=\begin{pmatrix}-1 & 0\\ \frac{2}{d(x)} & -1\end{pmatrix}$$

$$T^{-1}(x)=\begin{bmatrix}\cosh(x) & -\sinh(x)\\ -\sinh(x) & \cosh(x)\end{bmatrix} \qquad R^{-1}(x)\begin{pmatrix}-1 & 0\\ \frac{-2}{d(x)} & -1\end{pmatrix}$$

$$T(x)R(x)T(z)\begin{pmatrix}0\\ r\end{pmatrix}=R^{-1}(y)T^{-1}(y)R^{-1}(z)\begin{pmatrix}0\\ 1\end{pmatrix}\ ?$$

$$\sinh(x+z)-\sinh(y)=\frac{2\sinh(x)\sinh(z)}{d(x_0)} \quad (1) \qquad \left(d(x_0)=\frac{\sin\phi_0}{k(s_0)}\right)(3)$$

- $\cosh(y)=\cosh(x)\cosh(z)-\sinh(x)\sinh(z)\cos(r)$

  using $\cosh(x+z)=\cosh(x)\cosh(z)+\sinh(x)\sinh(z)$

  $\cosh(y)=\cosh(x+z)-\sinh(x)\sinh(z)-\sinh(x)\sinh(z)\cos(r)$

  $\Leftrightarrow \cosh(x+z)-\cosh(y)=[1+\cos(r)]\sinh(x)\sinh(z)$

  $=2\cos^2\left(\frac{r}{2}\right)\sinh(x)\sinh(z)$ (2)

$$\sin\phi_0=\sin\left(\frac{\pi-r}{2}\right)=\cos\left(\frac{r}{2}\right) \quad (4)$$

$$\frac{\cosh(x+z)-\cosh(y)}{2\cos^2\left(\frac{r}{2}\right)}\Rightarrow\sinh(x)\sinh(z)=\frac{\sinh(x+z)-\sinh(y)\cdot\cos\left(\frac{r}{2}\right)}{k(s_0)}$$ from (1) (2) (3) (4)

$$\therefore\ k(s_0)=\frac{\sinh(x+z)-\sinh(y)}{\cosh(x+z)-\cosh(y)}\cdot\cos^3\left(\frac{r}{2}\right)$$

using ($\sinh a-\sinh b=2\cosh\left(\frac{a+b}{2}\right)\sinh\left(\frac{a-b}{2}\right)$,
$\cosh a-\cosh b=2\sinh\left(\frac{a+b}{2}\right)\sinh\left(\frac{a-b}{2}\right)$
and $x+y+z=L \Rightarrow x+z=L-y$.)

$$k(s_0)=\frac{\sinh(L-y)-\sinh(y)}{\cosh(L-y)-\cosh(y)}\cos^3\left(\frac{r}{2}\right)$$

$$=\frac{2\cosh\left(\frac{L}{2}\right)\sinh\left(\frac{L-2y}{2}\right)}{2\sinh\left(\frac{L}{2}\right)\sinh\left(\frac{L-2y}{2}\right)}\cos^3\left(\frac{r}{2}\right)=\text{constant}\cdot\cos^3\left(\frac{r}{2}\right)$$